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ABSTRACT

Research has demonstrated the occurrence of two structurally distinct modes of vocalization in the infant/mother pair--coaction and alternation--that change developmentally over the first year of the infant's life. The present study investigated the vocalization latencies of three infant/mother pairs at three stages of infant development: at 10 days of age, just prior to the predominance of alternation, and during the emergence of alternation predominance. Data collection consisted of videotaping in families' homes or in a university laboratory. Coaction was operationalized as the occurrence of overlapping infant/mother vocalizations; alternation was operationalized as infant vocalization(s) occurring between the offset of the mother's initial vocalization and the onset of her next. At all three time periods, mothers exhibited shorter vocalization latencies than their infants, and some infant/mother dyads responded faster to each other than did others. Although mothers' vocalization latencies were only slightly correlated at the three time periods, infants' vocalization latencies were moderately correlated just prior to and during the predominance of alternation. These findings suggest that mothers develop generalized temporal expectancies in relation to their infants' development of stable vocalization latencies and that these expectancies may in turn facilitate the development of alternation predominance in the infant/mother pair. (Author/RH)

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Vocalization Latencies in the Infant-Mother Pair

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Abstract

The present study investigated the vocalization latencies (i.e., offset to onset) of 3 infant-mother pairs at 3 selected time periods (i.e., 10 days of age, just prior to alternation predominance, and during the emergence of alternation predominance). At all 3 time periods, mothers indicated shorter vocalization latencies than their infants, and some infant-mother dyads responded faster to one another than others. Although mothers' vocalization latencies were only slightly correlated with one another at the 3 time periods, infants' vocalization latencies were moderately correlated just prior to alternation predominance and during alternation predominance. These findings suggest that mothers develop generalized temporal expectancies in relation to their infants' developing stable vocalization latencies, which may, in turn, facilitate the development of alternation predominance in the infant-mother pair.

Research has demonstrated the occurrence of two structurally distinct modes of vocalization in the infant-mother pair--coaction and alternation (Stern, Jaffe, Beebe and Bennett, 1975)--that change developmentally over the first year of the infant's life (Kilbourne and Ginsburg, 1982a; Kilbourne and Ginsburg, 1982b). More specifically, Kilbourne and Ginsburg (1982a) initially found:

> The initial predominance of vocal coactions rapidly diminished between the infant's fourth and 4.5 month of life while alternation became the increasingly dominant mode of vocalization. Alternation was thus found to progress developmentally across the ten month period of the study so that by the last recording session (month number 13 1/2) 84% of the infant's vocalizations were occurring within the alternation mode. This rapid transition to and highly systematic development of alternation as a proportion of total vocalization was found to be, when having controlled for all other related factors, largely attributable to the infant's age/level of development and its quadratic function. (pp. 10-11)

In a replication study, Kilbourne and Ginsburg (1982b) again reported a transition from a predominantly coacting infant-mother vocalization pattern to a predominantly alternating infant-mother vocalization pattern during the infant's fourth month of life. They also reported data that indicated the relationship between dyadic vocalization patterns and age was not an "artifact" of the presence or absenced of nursing activity or the attentional focus of the mother. Kilbourne and Ginsburg (1982b) concluded:

> Our two studies provide reasonably strong grounds for the continued investigation of the protoconversational foundations for the emergence of linguistic competence in the baby, especially since that competence is displayed lagely in the discourses in which the baby participates. More concretely, our finding of a transition to a stable predominance of vocal alternation during the fourth month of life indicates the early emergence of turn-taking in vocal activities of the infant-mother dyad. (p. 8)

The developmental change in alternating and coacting vocalization patterns of the infant-mother pair suggests the possibility of other developmental functions of infant-mother vocalizations. It also suggests the importance of investigating infant-mother vocalization competencies for understanding the transition from predominating coaction patterns to predominating alternation patterns. One vocalization competency, for example, that seems worthy of investigation concerns the time it takes the infant to respond vocally to the mother's vocalizations. Vocalization latency may change developmentally for both infant and mother and influence the coordinated interactions of the infant-mother pair. Thus, an examination of vocalization latencies in the infant-mother pair may not only indicate a developing competency in the infant (i.e., the control of vocalizations), but also facilitate our understanding of the transition from predominating coaction patterns to predominating alternation patterns.

The purpose of the present study, then, was to examine the vocalization latencies of 3 infant-mother pairs at 3 selected time periods (i.e., 10 days of age, just before alternation

predominance, and during the emergence of alternation predominance). The vocalization latencies of infant to mother and mother to infant were examined for evidence of differential levels of competency and developmental trends in order to shed light on the regulation of early infant-mother vocalization patterns.

Methods

Two normal male infants and one normal female infant were observed in the present study. The parents of each infant were white and middle class.

The method of data collection consisted of video-taping in the families' home (for two of the infants) or in the university laboratory (for one of the infants). The home sessions for two of the infants consisted of approximately 20 minutes of feeding and play behavior without limiting the time spent in each. The laboratory sessions for one of the infants began 3 minutes after the cessation of feeding and continued for an average of 8.53 minutes. A 3/4 inch color video was employed in each instance (a panasonic). The video tapes were replayed in the laboratory and viewed by one or two trained observers. An Esterline Angus Recorder was used to score all infant-mother vocalizations.

The comparison of the infant's and mother's vocalizations constituted the basis for distinguishing time periods in the present study. Coaction was operationalized as the occurrence, within each session, of overlapping infant-mother vocalizations. Alternation was operationalized as infant vocalization(s) occurring between the offset of the mother's initial vocalization and the onset of her next vocalization without overlap with her infant's vocalization(s). A ratio of mean scores (i.e, the mean number of alternations for each session in relation to the mean total number of alternations and coactions in each session) was computed. Thus, the larger the ratio score, the larger the proportion of mean alternations to the mean total of all infant vocalizations. Starting at 10 days of age, the ratio scores permitted a way to distinguish when the transition to alternation predominance occurred and, then, to sample the session immediately preceding alternation predominance.

The actual dependent measure in the present study, vocalization latency, was operationalized as the measured record length from the offset of one partner's vocalization of the infant-mother pair to the occurrence or the onset of the other partner's vocalization of the same pair. This measure was recorded from the offset of the mother to the onset of the infant and from the offset of the infant to the onset of the mother. Vocalization latency was measured in units of length.

Results

Table 1 shows the mean alternation ratios (i.e., the mean number of alternations for each session in relation to the mean total number of alternations and coactions in each session) for each of the 3 infant pairs at the 3 selected time periods (i.e., 10 days of age, the session prior to alternation predominance, and the session when alternation became predominant).

Insert Table 1 about here

Since no data existed at 10 days of age for one of the infant-mother pairs, a 2 x 2 ANOVA that manipulated infant-mother pair (2) and latency order of the infant-mother pair (i.e., offset of infant's vocalization to onset of mother's vocalization vs. offset of mother's vocalization to onset of infant's vocalizations) was computed for the vocalization latencies of two of the infant-mother pairs. Significant main effects were indicated for both the dyadic factor ($F=6.76$, $df=1/1021$, $p=.009$) and the order factor ($F=7.52$, $df=1/1021$, $p=.006$). The mean vocalization latencies for the two infant-mother pairs at 10 days of age were .53 and 1.83, respectively. The mean vocalization

latencies for the mothers and infants were .29 and 1.52, respectively. Mothers were generally faster to respond to the offset of their infants' vocalizations than vise versa, and the two infant-mother pairs differed in how fast they responded to one another vocally. Also, a significant interaction between pair and order was indicated (F=6.02, df=1/1021, p=.01).

Next, a 3 x 2 ANOVA (infant-mother pair vs. order) which included all 3 infant-mother pairs was computed on the vocalization latencies during the session immediately prior to the emergence of alternation predominance. Significant main effects were indicated for the pair factor (F=88.24, df=2/1057, p=.001) and the order factor (F=34.74, df=1/1057, p=.001). The mean vocalization latencies for the 3 pairs just before alternation predominance were 5.00, .47 and 1.32, respectively. The mean vocalization latencies for the mothers and infants were .50 and 1.23, respectively. Again, mothers were faster to respond vocally to the offset of their infants' vocalizations than vise verse, and the 3 pairs differed in how fast they responded to one another vocally. Also, a significant interaction effect between pair and order was indicated (F=133.62, df=2/1057, p=.001).

The final 3 x 2 ANOVA (i.e., pair vs. order) which included all 3 pairs was conducted on the vocalization latencies during alternation predominance. A similar pattern of results was evident. Significant main effects were indicated for the pair factor (F=15.30, df=2/1057, p=.001) and the order factor

(F=14.81, df=1/1057, p=.001). The mean vocalization latencies for the 3 pairs during the emergence of alternation predominance were 3.77, .52 and 1.61, respectively. The mean vocalization latencies for the mothers and infants were .45 and 1.43, respectively. Similar to the two previous analyses, mothers were faster to respond vocally than were their infants and the 3 pairs differed in their vocalization latencies. Also, a significant interaction was indicated between pair and order (F=19.82, df=2/1057, p=.001). Table 2 shows the mean vocalization latencies for all pairs and individuals across the 3 time periods of the study.

Insert Table 2 about here

A correlational analysis was then conducted to assess the relationship between the mothers' vocalization latencies at the two time periods prior to alternation predominance with their vocalizations during alternation predominance. A similar analysis was conducted to assess the relationship between the infants' vocalization latencies at the two time periods prior to alternation predominance with their own vocalizations during alternation predominance. The mothers' vocalization latencies at the two time periods prior to the emergence of alternation predominance were only slightly correlated with their vocalization latencies during alternation predominance (10 days of age [r=-.06, p=.08, n=511] and just before alternation

predominance [r=-.08, p=.04, n=552]. However, while the infants' own vocalization latencies at 10 days of age did not correlate significantly with their vocalization latencies during alternation predominance (r=.03, p=.26, n=511), the vocalization latencies of the 3 infants just before alternation predominance correlated significantly with their vocalization latencies during alternation predominance (r=.31, p=.001, n=511).

Discussion

Differential levels of competency were indicated for mothers and infants and for different infant-mother pairs. In other words, both individual and pair differences were indicated in the present study. Mothers were faster to respond vocally to the offset of their infant's vocalizations than vise versa, and the infant-mother pairs differed in how fast they generally responded vocally to one another. These individual and pair differences were evident at all three selected time periods (i.e., 10 days of age, just before alternation predominance, and during alternation predominance). These findings suggest that mothers play a dominant role in regulating the vocalization patterns between themselves and their infants.

However, it would be a mistake to ignore the contribution of the infant. The infant's vocalization latencies just prior to alternation predominance were moderately correlated with their later vocalization latencies during the emergence of alternation

predominance. This same relationship was not evident for the mothers. While the vocalization latencies of the mothers were shorter at all time periods, they were nonetheless only slightly correlated with each other at the three different time periods (i.e., the very low but significant correlations can probably be attributed to the large size of the Ns). Infants, on the other hand, were developing a fairly stable and moderately significant pattern of vocal response prior to and during the emergence of alternation predominance. These findings suggest that: 1) infants were developing relatively stable vocalization latencies in the infant-mother dyad; and 2) a relatively stable pattern of infant vocalization latencies may make it easier for the mother to "fine tune" (Bruner, 1978) her vocalizations to those of her infant, and thus facilitate the emergence of alternation predominance.

In conclusion, the developing capacity of the infant to stabilize or maintain its vocalization latencies may facilitate the emergence of alternation predominance in the infant-mother pair. That is, mothers may acquire a generalized temporal expectation concerning how long it approximately takes their infants to respond vocally to them and then adjust their vocal pauses so as not to override their infants vocalizations. This might explain, in part, the mothers role in the emergence of alternation predominance given previous findings which have minimized the contribution of the situation and the mother's attentional focus (Kilbourne and Ginsburg, 1982a; 1982b). Thus,

by stablizing their vocalization latencies, infants may help mothers, vis a vis predictability (Cairns, 1979), to "fine tune" (Bruner, 1978) their vocal pauses and vocalization latencies to the vocalizations of their infants. Indeed, in the present study, this explanation suggests the important role of the interactional dyad, and not just maturation, in the developing similarity between the temporal organization of the infant's vocalizations (i.e., alternations) and the temporal requirements of adult conversation.

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TABLE 1. Mean Ratio Scores at 3 Time Periods (n=3)*

	Dyad 1 (m)	Dyad 2 (m)	Dyad 3 (f)
10 days	------	.41	.87
Session Before Alternation Predominance	.36 (15.6 weeks)	.55 (14.4 weeks)	.44 (11.1 weeks)
Session of Alternation Predominance	.77 (17.6 weeks)	.76 (16.4 weeks)	.75 (12.1 weeks)

*Indicates proportion of mean alternatives to mean total vocalizations.

TABLE 2. Mean Vocalization Latencies for Individuals and Dyads*

	Dyads			Individuals	
	1	2	3	Mothers	Infants
10 days	--	.53	1.83	.29	1.52
Session before Alternation Predominance	5.00	.47	1.32	.50	1.23
Session of Alternation Predominance	3.77	.52	1.61	.45	1.43

*Mean values are reported in units of length.